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NOTES ON GEOGRAPHIC DISTRIBUTION

Update on the distribution of *Trinycteris nicefori* Sanborn, 1949 (Chiroptera: Phyllostomidae): New record for the Amazonia of Brazil

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ABSTRACT: We present herein the first record of the small phyllostomine *Trinycteris nicefori* for the Brazilian state of Rondônia. The specimens were mist netted near the banks of Rio Madeira, in the municipality of Porto Velho. The capture area can be classified as dense ombrophilous forest of the Amazonian biome. Morphometric and qualitative data are presented, along with a table comparing *Triniycteris* to the two other similar genera, *Glyphonycteris* and *Lampronycteris*. The disjunct distribution of *T. nicefori* is briefly discussed.

The genus *Trinycteris* Sanborn, 1949, originally described as a subgenus of *Micronycteris* Gray, 1866, was firstly recognized as a monotypic genus by Simmons (1996) and Simmons and Voss (1998). This assertion, posteriorly confirmed by Wetterer *et al.* (2000), was based on morphological, karyological and molecular data. Currently, *Trinycteris nicefori* Sanborn, 1949 shows a disjunct distribution, ranging from southern Mexico, Central America, Trinidad, Colombia, Venezuela, the Guyanas, Suriname, Peru, Ecuador, Bolivia and Brazilian Amazonia. There are also isolated records from the Atlantic Forest of eastern Brazil (Simmons 2005; Williams and Genoways 2008). Most of the records reported for the Brazilian territory are from the Amazon (Bernard *et al.* 2011); however, the species was recorded in three localitites from the Atlantic Forest: Linhares in the state of Espírito Santo (Peracchi and Albuquerque 1993); Itapebi and Una, in the state of Bahia (Faria *et al.* 2006) and also from an transitional region near the border of the Amazonian and Cerrado biomes (Nunes *et al.* 2005) (Figure 1; Table 3). Due to its low capture rate in faunal inventories, both in the Atlantic Forest and in the Amazon, *T. nicefori* shows many gaps along its distribution. The reduction of those gaps will improve the understanding of its current biogeographical distribution, as well as the historical processes that originated it. In this sense, the present work extends the distribution of *T. nicefori* in the Brazilian Amazonia, providing the first record of the species for the state of Rondônia, which is the southernmost record of the species for the Amazon biome in Brazil.

The specimens, two males (MZUSP 35194, MZUSP 35196) and two females (MZUSP 35193, MZUSP 35195), were mist netted at ground level, between November 2010 and June 2011, in three collecting localities next to the margins of the Rio Madeira, at the Abunã and Caiçara district, municipality of Porto Velho (09°37'S 65°25'W, figure 1). The predominant vegetation type is Alluvial Ombrophilous Dense Forest, with medium and large trees, palms, woody vines, and epiphytes.

All the captures of *Trinycteris nicefori* occurred during the first six hours of the night and in those periods individuals of *Rhinophylla pumilio* Peters 1865, *Artibeus obscurus* (Schinz, 1821), *Artibeus lituratus* (Olfers, 1818), *Artibeus planirostris* (Spix, 1823), *Carollia perspicillata* (Linnaeus, 1758), and *Tonatia saurophila* Koopman and Williams, 1951 were also captured. The specimens were handled in accordance with the protocols described by Sikes *et al.* (2011): fixed in formaldehyde 10% and preserved in ethanol 70%, with subsequent extraction of the skull. After recording the basic external and cranial measurements (Table 1), the voucher specimens were deposited at the mammal collection of the Museu de Zoologia da Universidade de São Paulo (MZUSP).

The genus *Trinycteris* may be confused with small reddish-brown individuals of *Carollia*; however, *Trinycteris* differs from individuals of *Carollia* mainly by the absence of central papilla-like protuberances (Charles-Dominique *et al.* 2001). *Trinycteris* can be distinguished from other Phyllostominae genera by the following set of characters: two pairs of lower incisors; three lower premolars; tail enclosed in the interfemoral membrane, but not extending to posterior margin; rostrum shorter than braincase; lips and chin without papilla-like protuberances; lack of a band of skin across the top of the head connecting the ears (Williams and Genoways 2008). In regard to the other former subgenera of *Micronycteris* (*Glyphonycteris*, *Lampronycteris*, and *Neonycteris, sensu* Samborn 1949), *Trinycteris* can be differentiated from them by its greatly reduced first and second upper premolars, when compared to the adjacent teeth, and by presenting a small anterior cuspid in both teeth (Sanborn 1949). Additionally the set of characters presented in Table 2 help to distinguish *T. nicefori* from *Lampronycteris brachyotis* (Dobson, 1879)

and *Glyphonycteris sylvestris* (Thomas, 1896). Some of the features associated in this table are illustrated in Figure 2. The current records of *Trinycteris nicefori* show a major gap from Amazonia to eastern Brazil, suggesting a disjunctive distribution between both biomes, as found in other mammals such as the red-handed howler monkey (*Alouatta belzebul*), the kinkajou (*Potos flavus*), the Brazilian squirrel (*Guerlinguetus alphonsei*), and the silky anteater (*Cyclopes didactylus*). The absence of records in the Caatinga and Cerrado (*sensu stricto*) biomes indicates the likely preference of *T. nicefori* for mesic environments, and its intolerance to arid conditions. This reinforces the hypothesis that a corridor of forested habitats linked Amazonia and coastal Atlantic Forest relatively recently (Bonvicino *et al.* 1989; Vivo 1997), although a lack of sampling effort in the northern hiatus should not be discarded. Future phylogeographic studies are thought necessary to clarify the relationships between these populations, possible dispersal routes, or even vicariant processes.

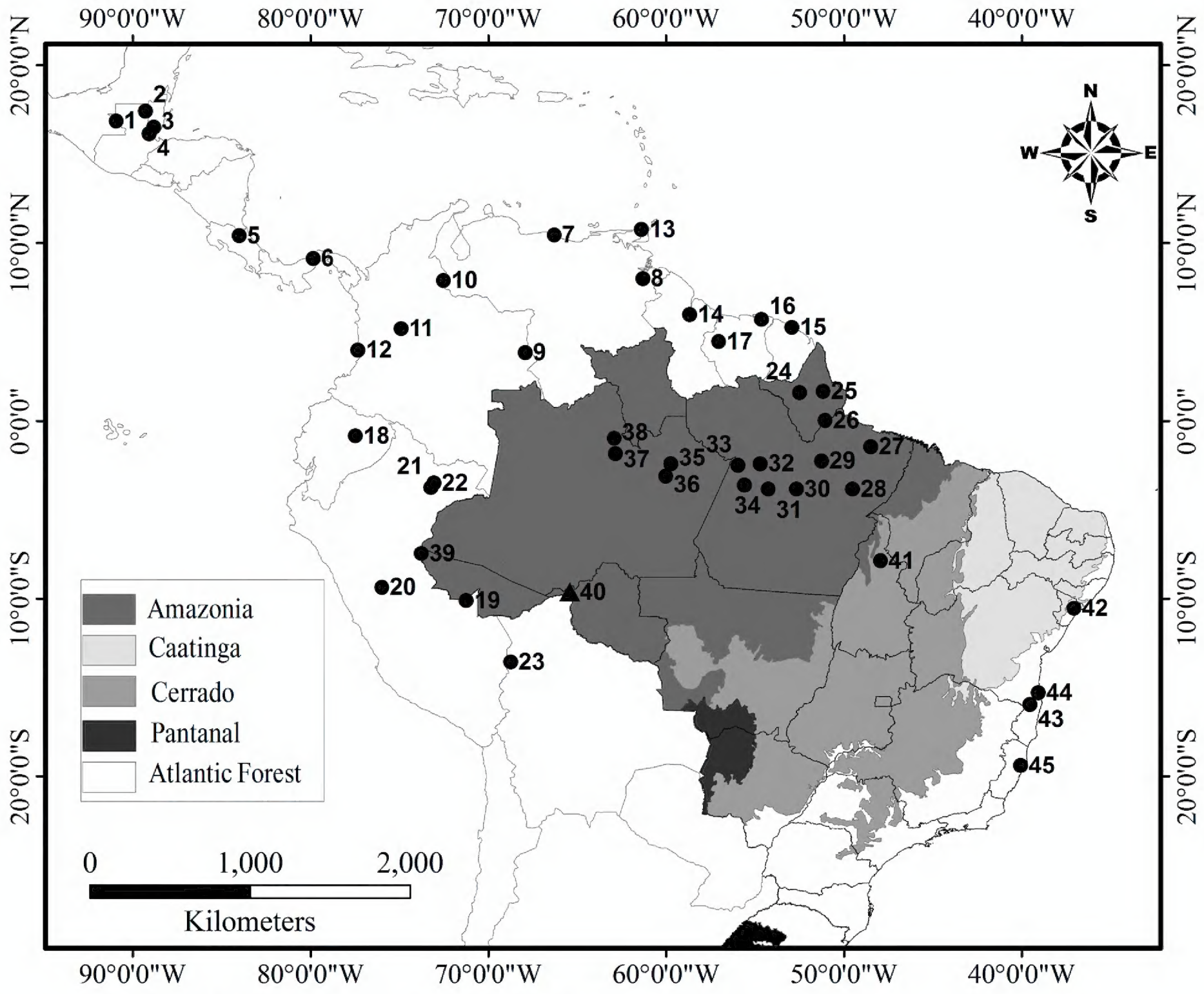

Figure 1. Geographic distribution of *Trinycteris nicefori*. Numbers indicate the localities listed in Table 3.

Table 1. Cranial measurements of the *Trinycteris nicefori* specimens collected during the present study, holotype (Cucutá, Colombia; Sanborn 1949), and specimens from Simmons and Voss (1998).

PARAMETER	PRESENT STUDY		HOLOTYPE	SIMMONS AND VOSS (1998)	
	MALES (N=2)	FEMALE (N=2)		MALES (N=3)	FEMALES (N=2)
Greatest length of skull	20.05 - 19.56	19.48 - 19.58	20.5	20.1 (19.54-20.39)3	19.71 - 20.49
Condylobasal length	18.22 - 18.22	18.03 - 18.18	18.5	18.5 (18.06-18.72)3	17.99 - 19.07
Mastoid breadth	8.78 - 8.76	8.35 - 8.68	8.9	8.67 (8.74-9.05)3	8.43 - 8.62
Zygomatic breadth	9.85 - 9.37	9.62 - 9.76	9.6	9.13 (8.84-9.51)3	9.05 - 9.14
Breadth of braincase	7.91 - 7.99	7.78 - 8.06	8.2	8.12 (7.92-8.22)3	7.97 - 8.26
Postorbital constriction	4.36 - 4.22	4.12 - 4.32	4.3	4.03 (3.92-4.11)3	4.21
Palatal length	9.87 - 9.56	9.32 - 9.60	8.2	-	-
Breadth across upper canines	3.44 - 3.13	3.22 - 3.34	3.3	-	-
Breadth across upper molars	6.56 - 6.37	6.35 - 6.48	6.2	5.99 (5.85-6.13)3	5.99 - 6.1
Length of maxillary toothrow	5.96 - 7.34	5.69 - 5.78	-	7.79 (7.14-7.45)3	6.99 - 7.56
Length of mandible	13.52 - 13.13	12.81 - 12.98	-	-	-
Height of ramus at the coronoid process	4.66 - 4.69	4.72 - 4.83	-	-	-

Table 2. Summary of the diagnostic characteristic of *Trinycteris nicefori*, *Lampronycteris brachyotis*, and *Glyphonycteris sylvestris*.

TAXA	CHARACTERS					
	FOREARM	GLS[1]	WING	CALCAR	UPPER INCISORS	DORSAL STRIPE
T. nicefori	37.1–40.2	20.7–20.2	Fourth metacarpal shortest, third longest. Second phalanx of third metacarpal a little longer than first phalanx. Second phalanx of fourth metacarpal slightly longer than first phalanx.	Less than half the length of foot with claws	Not chisel-shaped, projected forward and not in line with canines; distinctly shorter and narrower than canines (Figure 2 E and F)	Usually evident on the lower back
L. brachyotis	38.3–42.5	21.2–21.6	Metacarparls gradually decrease in size, the fifth being the shortest. Second phalanx of fourth finger longer than first phalanx.	Shorter than foot with claws	Chisel-shaped and in line with canines; upper inner incisors less than 1/2 the height of upper canines (Figure 2 C and D)	Absent
G. sylvestris	37–44	20.2–22.8	Fourth metacarpal the shortest, fifth the longest. Second phalanx of fourth finger longer than first phalanx	Shorter than foot with claws	Chisel-shaped; First upper incisors similar to canines in length; short upper canines that are only a little longer than the incisors (Figure 2 A and B)	Absent

[1] Greatest length of skull

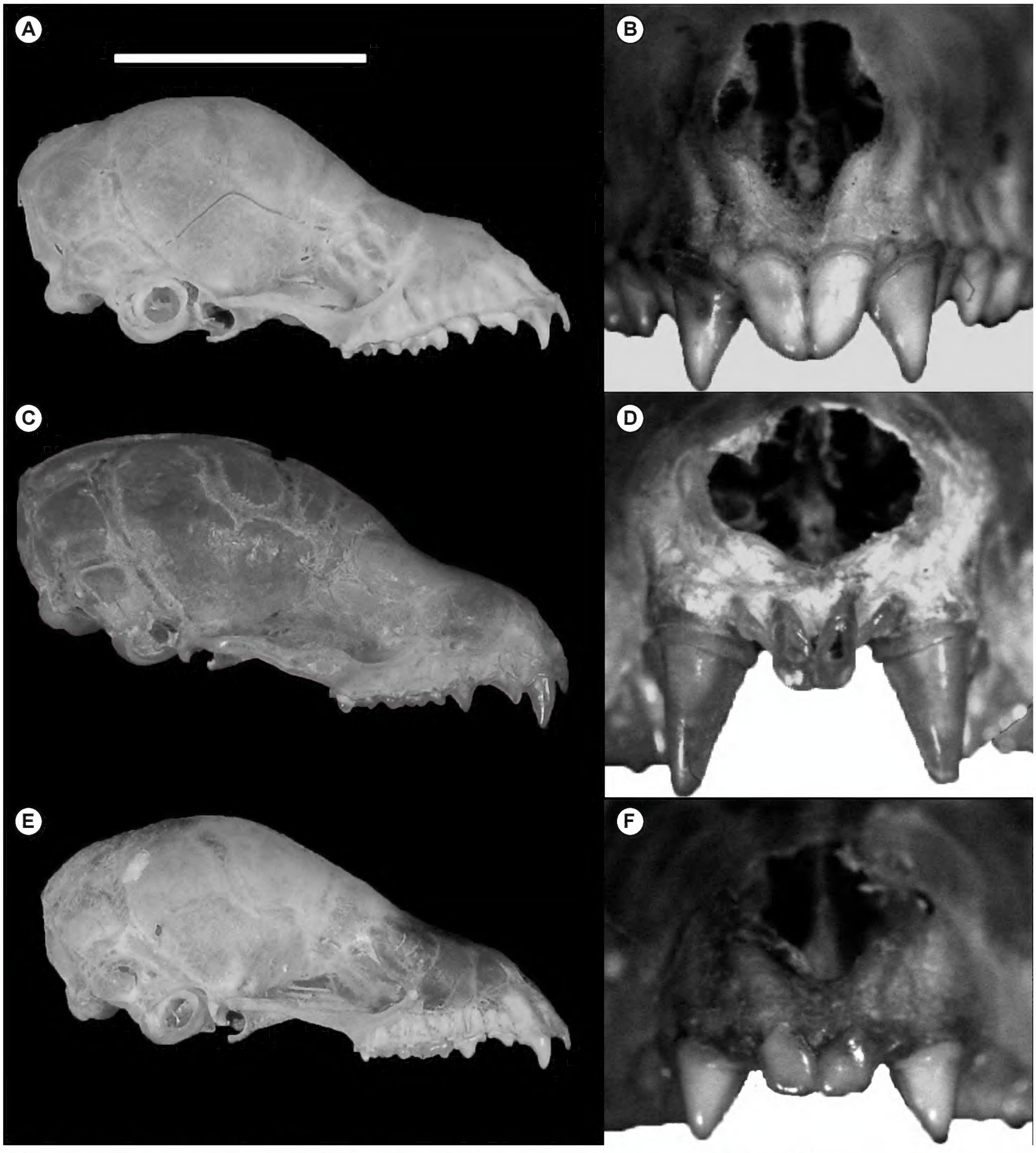

Figure 2. Lateral and frontal views of the skulls of *Glyphonycteris sylvestris* (A and B), *Lampronycteris brachyotis* (C and D), and *Trinycteris nicefori* (E and F). Bar = 10 mm.

Table 3. Localities at which the occurrence of the *Trinycteris nicefori* has been confirmed. The code numbers refer to the points shown in Figure 1.

COUNTRY / POINT	COORDINATES	LOCALITY	REFERENCE
MEXICO			
1	16°52'N, 90°56'W	Chiapas-Yaxchilán	Escobedo-Morales *et al.* 2006
BELIZE			
2	17°25'N, 88°77'W	Cayo-Pond, Las Cuevas Research Station	Escobedo-Morales *et al.* 2006
3	16°31'N, 88°49'W	Toledo-Quebrada de Oro	McCarthy and Blake 1987
4	16°09'N, 89°05'W	Toledo-Aguacate	McCarthy 1987
COSTA RICA			
5	10°25'N, 84°00'W	La Selva Biological Station	LaVal and Fitch 1977
PANAMA			
6	09°09'N, 79°51'W	Barro Colorado Island	Giannini and Kalko 2004
VENEZUELA			
7	10°28'N, 66°17'W	Miranda-Trujillo 19 kmN of Valera; Birongo	Williams and Genoways 2008
8	08°00'N, 61°18'W	Bolívar-Unidad V, Reserva Forestal Imataca	Ochoa 1995
COLOMBIA			
9	13°03'N, 67°55'W	Inírida	Ferrer-Pérez *et al.* 2009
10	07°54'N, 72°31'W	Cucuta (type locality)	Sanborn 1949
11	05°12'N, 74°54'W	Tolima-Mariquita	Muñoz 2001
12	03°59'N, 77°20'W	Valle del Cauca-Bahía Málaga Naval Base	Alberico 1987
TRINIDAD Y TOBAGO			
13	10°46'N, 61°23'W	Trinidad, Las Cuevas	Carter *et al.* 1981
GUYANA			
14	06°00'N, 58°40'W	Cuyuni-Mazaruni, Bartica, 24 miles along Portaro Road	Hill 1965
FRENCH GUIANA			
15	05°17'N, 52°55'W	Paracou	Simmons and Voss 1998
SURINAM			
16	05°43'N, 54°38'W	Marowijne, Moengo, 10 kilometers N and 24 km W	Genoways and Williams 1979
17	04°28'N, 57°02'N,	Bakhuis	Lim 2009
18	00°50'S, 77°28'W	Orellana-Santa Rosa de Arapino	Albuja 1999
PERU			
19	10°06'S, 71°14'W	Ucayali-Balta, Río Curanja	Voss and Emmons 1996
20	09°21'S, 75°59'W	Huánuco-Tingo María, Hotel Turistas	Bowles *et al.* 1979
21	03°44'S, 73°14'W	Iquitos	Klingbeil and Willig 2010
22	03°29'S, 73°03'W	Loreto-Puerto Indiana	Pirlot 1968
BOLIVIA			
23	13°34'S, 68°44'W	La Paz-La Paz	Anderson 1997
BRAZIL			
24	01°36'N, 52°29'W	Amapá-Parque Nacional Montanhas do Tumucumaque	Martins *et al.* 2006
25	01°40'N, 51°10'W	Amapá-Floresta Nacional do Amapá	Martins *et al.* 2006
26	00°02'N, 51°03'W	Amapá-Macapá	Peracchi *et al.* 1984
27	01°27'S, 48°30'W	Pará-Belém	Bernard *et al.* 2001
28	03°50'S, 49°30'W	Pará-Tucuruí	Pine *et al.* 1996
29	02°15'S, 51°15'W	Pará-FLONA Caxiuanã	Marques-Aguiar and Aguiar 2002
30	03°50'S, 52°40'W	Pará-Altamira	Voss and Emmons 1996
31	03°50'S, 54°15'W	Pará-Parque Nacional da Amazônia	Marques 1985
32	02°24'S, 54°42'W	Pará-Santarém	Bernard 2001
33	02°30'S, 55°57'W	Pará-Alter do Chão	Bernard and Fenton 2002
34	03°36'S, 54°59'W	Amazonas-Parque Nacional do Tapajós	Presley *et al.* 2008
35	02°24'S, 59°43'W	Amazonas-Manaus, PDBFF	Sampaio *et al.* 2003
36	03°06'S, 60°01'W	Amazonas-Manaus, Reserva Ducke	Reis and Peracchi 1987
37	01°50'S, 62°50'W	Amazonas-Parque Nacional Jaú	Barnett *et al.* 2006
38	00°58'S, 62°55'W	Amazonas-Barcelos	Moratelli *et al.* 2010
39	07°27'S, 73°46'W	Acre-Parque National da Serra do Divisor	Nogueira et al. 1999
40	09°37'S, 65°25'W	Rondônia-Porto Velho, Abunã	Present study
41	07°52'S, 47°56'W	Tocantins- Palmeirante	Nunes *et al.* 2005
42	10°32'S, 37°03'W	Sergipe-RVS Mata do Junco	Brito and Bocchiglieri 2012
43	15°57'S, 39°32'W	Bahia-Itapebi	Faria *et al.* 2006
44	15°17'S, 39°04'W	Bahia-Una	Faria *et al.* 2006
45	19°25'S, 40°03'W	Espírito Santo-Linhares	Peracchi and Albuquerque 1993

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